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Docket No.: MICRON.272A

July 17, 2006

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TRANSMITTAL LETTER

APPEAL BRIEF

Applicant	:	Terry L. Gilton
App. No	:	10/666,586
Filed	:	September 18, 2003
For	:	PARTICLE DETECTION METHOD
Examiner	:	Sang H. Nguyen
Art Unit	:	2877

CERTIFICATE OF MAILING

I hereby certify that this correspondence and all marked attachments are being deposited with the United States Postal Service in an Express Mail envelope with label no. EV915028747US addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on

July 17, 2006
(Date)

Pui Tong Ho, Reg. No. 44,155

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

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Customer No.: 20,995

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Dated: July 17, 2006

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APPEAL BRIEF UNDER 37 C.F.R. 41.37

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Sir:

In accordance with the Notice of Appeal filed May 9, 2006, Applicant submits this Appeal Brief, which is timely filed by August 9, 2006 with a one-month extension.

TABLE OF CONTENTS

I. REAL PARTY IN INTEREST

The real party in interest is Micron Technologies, Inc.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences for this application.

III. STATUS OF CLAIMS

Claims 1–24 stand rejected. Claims 25–51 have been canceled. Claims 1–24 are appealed.

IV. STATUS OF AMENDMENTS

No amendments were filed after the final rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

None of the appealed claims is a means- or step-plus-function claim.

Claim 1 is the only independent claim on appeal and is directed to a method for detecting a particle on a substrate used in the fabrication of an integrated device. As discussed in the specification, particle contamination on such substrates can result in complete failure of a device manufactured thereon. *See, e.g.*, Specification at 1, ll. 10–11 (¶ **[0002]**). Some types of particle contamination are more problematic than others, for example, copper, nickel, and iron particles. *See, e.g.*, Specification at 1, ll. 13–19 (¶ **[0002]**). In particular, some of these types of particles catalyze the polymerization of selected monomers, thereby making the particles larger and easier to detect using a particle counter. *See, e.g.*, Specification at 1, ll. 24–26 (¶ **[0004]**). Claim 1 provides a method for detecting such particles. The substrate is contacted with a monomer, the polymerization of which is catalyzed by a type of particle that one wishes to detect. *See e.g.*, Specification at 4, ll. 2–3 (¶ **[0017]**); 6, ll. 25–26 (¶ **[0027]**); FIG. **1**, step **110**. As discussed above, contaminant particles on the wafer that catalyze the polymerization of the monomer are larger due to polymer growth on these particles, hence easier to detect. *See, e.g.*, Specification at

4, ll. 11–13 (¶ **[0017]**); FIGS. **3A** and **3B**. The particles are then detected using a particle counter. *See e.g.*, Specification at 4, ll. 7–13 (¶ **[0017]**); FIG. **1**, step **120**.

Claims 2–24 are directly or indirectly dependent on claim 1.

Claims 2–6 provide additional characteristics of the particle detector in the detection step **120** (FIG. **1**). Claim 2 recites that the particle counter detects the number of particles, sizes of the particles, positions of the particles, or combinations thereof. *See, e.g.*, Specification at 4, ll. 9–10 (¶ **[0017]**). Claim 3 recites that the particle counter is capable of detecting particles on both sides of the substrate without unmounting the substrate. *See, e.g.*, Specification at 6, ll. 15–17 (¶ **[0025]**). Claims 4 recites that the particle counter detects particles optically. *See e.g.*, Specification at 5, l. 3 (¶ **[0019]**); 6, ll. 12–13 (¶ **[0025]**). Claim 5 recites that the particle counter is a laser scanner. *See, e.g.*, Specification at 2, ll. 27–28 (¶ **[0008]**). Claim 6 recites that particle counter detects a property selected from the group consisting of absorbance, fluorescence, reflectance, refractive index, and polarization. *See, e.g.*, Specification at 6, ll. 17–19 (¶ **[0025]**).

Claims 7 and 8 provide for identifying the composition of the detected particle. Claims 7 recites that the composition of the particle is identified. *See, e.g.*, Specification at 4, ll. 16–17 (¶ **[0018]**). Claim 8 is dependent on claim 7 and recites that the composition of the particle is identified by the polymerization rate of the monomer. *See, e.g.*, Specification at 4, ll. 17–19 (¶ **[0018]**).

Claim 9 recites that the selected monomer is polymerized by a plurality of particle types. *See e.g.*, Specification at 3, ll. 3–4 (¶ **[0010]**); 5, ll. 23–27 (¶ **[0022]**).

Claim 10 provides for additional cycles of the detection method in a step **130** (FIG. **1**) by repeating the contacting **110** (FIG. **1**) and detecting steps **120** (FIG. **1**). *See, e.g.*, Specification at 4, ll. 22–25 (¶ **[0018]**).

Claims 11–13 provide for contacting the substrate with a plurality of monomers in the contacting step **110** (FIG. **1**), for example, to detect a plurality of particle types. Claim 11 recites that the substrate is contacted with a plurality of monomers. *See, e.g.*, Specification at 5, ll. 26–28 (¶ **[0019]**). Claim 12 recites that the plurality of monomers contacts the substrate

simultaneously. *See, e.g.*, Specification at 5, ll. 28–29 (¶ **[0019]**). Claim 13 recites that the plurality of monomers contacts the substrate sequentially. *Id.*

Claims 14 and 15 provide additional characteristic of the particle to be detected. Claim 14 recites that the particle is a metal. *See, e.g.*, Specification at 6, ll. 20–21 (¶ **[0026]**). Claim 15 recites that the metal is copper. *See, e.g.*, Specification at 6, ll. 22–24 (¶ **[0026]**).

Claims 16 and 17 provide additional characteristics of the substrate on which the particle is to be detected. Claim 16 recites that the substrate comprises silicon. *See, e.g.*, Specification at 6, ll. 7–9 (¶ **[0024]**). Claim 17 recites that the substrate comprises a single crystal silicon wafer. *See, e.g.*, Specification at 6, ll. 9–11 (¶ **[0024]**).

Claims 18–21 provide additional characteristics of the monomer used in the contacting step **110** (FIG. **1**). Claim 18 recites that the monomer is in the vapor phase. *See e.g.*, Specification at 7, l. 7 (¶ **[0029]**). Claim 19 recites that the monomer is an alkene. *See e.g.*, Specification at 10, ll. 28–29 (¶ **[0042]**). Claim 20 recites that the alkene is styrene, methyl acrylate, ethyl acrylate, methyl methacrylate, or acrylonitrile. *See e.g.*, Specification at 10, l. 29–11, l. 4 (¶ **[0042]**); 3, ll. 6–8 (¶ **[0011]**). Claim 21 recites that the monomer is aniline or thiophene. *See e.g.*, Specification at 14, l. 6–15, l. 13 (¶¶ **[0053]**–**[0054]**).

Claims 22 and 23 provide for the addition of a polymerization initiator in the contacting step **110** (FIG. **1**). Claim 22 recites an initiator. *See e.g.*, Specification at 8, ll. 16–17 (¶ **[0034]**). Claim 23 recites that the initiator is benzyl bromide. *See e.g.*, Specification at 11, ll. 17–22 (¶ **[0045]**); 15, ll. 16–18 (¶ **[0058]**).

Claim 24 recites that the substrate is irradiated with electromagnetic radiation. *See e.g.*, Specification at 8, ll. 10–11 (¶ **[0033]**).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Each of the appealed claims stands rejected as unpatentable under 35 U.S.C. §103(a) over combinations of six references: Scheer (U.S. Patent No. 5,194,297), Ballas (U.S. Patent No. 4,812,396), Asano (JP 2003031542), Tullis (U.S. Patent No. 5,144,524), Yoshimura (U.S. Patent No. 5,194,548), and Hahn (U.S. Patent No. 4,170,663).

Claims 1–2, 7–10, 14–21, and 24 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Scheer in view of Ballas.

(A) Regarding claim 1, the Examiner states that Scheer discloses a method of detecting a particle on a substrate and that Ballas discloses a particle that catalyzes the polymerization of a monomer. The Examiner states that it would have been obvious to combine Scheer and Ballas to accurately detect enzyme [on a substrate] with optimum sensitivity at high speed.

(B) Regarding claims 7 and 8, the Examiner states that Ballas discloses identifying the identity of a particle by polymerization rate.

(C) Regarding claims 9 and 10, the Examiner states that Ballas discloses a monomer polymerized by a plurality of particle types. The Examiner's motivation to combine is to visually detect the particle because direct agglutination is easier to detect than agglutination inhibition.

(D) Regarding claims 14 and 15, the Examiner states that Scheer discloses a metal particle (aluminum), and that it would have been obvious to replace the aluminum particle with a copper particle.

(E) Regarding claims 17 and 24, the Examiner states that Scheer discloses a single crystal silicon wafer, and irradiation by an electromagnetic radiation or laser source.

(F) Regarding claim 18, the Examiner states that Scheer discloses a vapor phase monomer.

(G) Regarding claims 19–20, the Examiner states that Ballas discloses an alkene monomer selected from the group consisting of styrene, methyl acrylate, ethyl acrylate, methyl methacrylate, and acrylonitrile. The Examiner's motivation to combine is to add monomers at a controlled rate in increasing the particle size in a seed emulsion.

(H) Regarding claim 21, the Examiner states that it would have been obvious to use aniline or thiophene as the monomer.

(I) Claim 3 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Scheer in view of Ballas and further in view of Asano. The Examiner states that Asano discloses detecting particles on both sides of a substrate without unmounting the substrate, and that one skilled in the

art would have been motivated to combine the references to accurately detect particles with high speed during wafer cleaning.

(J) Claims 4–6 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Scheer in view of Ballas and further in view of Tullis. The Examiner states that Tullis discloses an optical scanner that is a laser scanner, and that detects a property selected from the group consisting of absorbance, fluorescence, reflectance, refractive index, and polarization. The Examiner provides as motivation for combining the references detecting and analyzing particles on silicon wafers with sensitivity, counting accuracy, uniformity, dynamic range, spatial resolution, and stability.

(K) Claims 11–13 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Scheer in view of Ballas and further in view of Yoshimura. The Examiner states that Yoshimura discloses contacting a substrate with a plurality of monomers, simultaneously or sequentially. The Examiner provides as motivation for combining the references improving non-linear optical characteristics of materials formed by molecular beam deposition or molecular beam epitaxy.

(L) Claims 22–23 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Scheer in view of Ballas and further in view of Hahn. The Examiner states that Hahn discloses benzyl bromide as a free radical initiator. The Examiner provides as motivation for combining the references reducing low gloss and providing substantial resistance to burnishing in radiation cured organic materials.

VII. ARGUMENT

A *prima facie* rejection for obviousness requires: (1) a disclosure or suggestion of every element of the claim in the cited reference or references; (2) a suggestion or motivation, in the references or known to one skilled in the art, to modify or combine the references; and (3) a reasonable expectation of success. The suggestion to combine and the reasonable expectation of success must be found in the cited references. *In re* Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Applicant submits that the Examiner has failed to establish a *prima facie* case of obviousness for any of the appealed claims. At best, the Examiner is picking-and-choosing prior

art corollaries for individual features recited in the claims, using the claims themselves as a blueprint. Nothing in the cited references suggests the combinations of features recited in the appealed claims. At worst, the prior art corollaries for the individual claim features do not even individually meet the claim limitations. Accordingly, Applicant requests that the Board overturn the rejections and find the appealed claims allowable.

A. Claim 1

Claim 1 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Scheer in view of Ballas. Applicant submits that claim 1 is not obvious over Scheer and Ballas because the cited references do not disclose or suggest every element recited in the claims, the Examiner has not provided a proper motivation to combine the references, and there is no reasonable expectation of success in the cited combination.

Claim 1 provides:

1. A method for detecting a particle on a substrate, wherein the substrate is used in the fabrication of an integrated device, the method comprising:

contacting the substrate with a monomer, wherein the particle catalyzes the polymerization of the monomer, and

detecting the particle using a particle counter.

As discussed above in section III, claim 1 recites at least the following features: a substrate used in the fabrication of an integrated device; a particle, which catalyzes the polymerization of a monomer, on the substrate; contacting the substrate with a monomer; and detecting the particle on the substrate. Even assuming for the sake of argument that each of these features is disclosed in the cited references, the Examiner has made no showing that any of the cited references discloses or even suggests the claimed *combination*. As will become apparent in the detailed discussion of each of the rejections that follows, the Examiner's purported motivations to combine the cited references are insufficient as a matter of law. First, the Examiner's purported motivations would not lead one skilled in the art to combine the cited references. Second, the purported motivations are inconsistent with each other.

Instead, the Examiner appears to have engaged in *post-hoc* rearrangement of prior art corollaries of the claim elements into the appealed claims. "If identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue. Furthermore, rejecting patents solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed invention itself as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention." *In re Rouffet*, 149 F.3d 1350, 1357, 47 USPQ2d 1453, 1457–58 (Fed. Cir. 1998).

Applicant further notes that Examiner did not provide an explanation in the responses to Applicant's previous argument of hindsight reconstruction. Instead, the Examiner's response consisted of simply setting forth a portion of M.P.E.P. 2145(X)(A). As such, the Examiner's response was entirely non-substantive, and consequently, improper. For at least this reason, the rejections of the appealed claims are improper and should be overruled.

1. Ballas and Scheer Do Not Disclose or Suggest Detecting a Particle on a Substrate or a Particle that Catalyzes the Polymerization of a Monomer

The Examiner states that Scheer discloses a method for detecting a particle on a substrate, and Ballas discloses a method of detecting enzymatic activity using a particle that catalyzes the polymerization of a monomer. A discussed below, the Examiner has not met the burden of showing that Scheer discloses a method for detecting a particle on a substrate, or that Ballas discloses a particle that catalyzes the polymerization of a monomer.

Ballas. Ballas is directed "to particle agglutination based diagnostic method for detecting enzymatic activity in liquid test samples." Ballas at 1:12–14. The agglutination system comprises highly refractive particles with a ligand conjugated thereto; a binding partner specific to the ligand, and capable of binding at least two ligands; and a substrate for an enzyme, where the product of the enzyme and substrate competes with the ligand for the binding partner. Ballas at 2:50–64. The assay uses agglutination, which is an aggregation or clumping together of, in this case, the highly refractive particles. *Agglutination is not polymerization.* In Ballas, the agglutination is of highly refractive particles. The agglutination has nothing to do with monomers, which are used in a *completely separate process in the manufacture of the highly*

refractive particles, discussed below. Consequently, all disclosure of agglutination is entirely irrelevant to the appealed claims. Ballas also discloses a method for manufacturing the highly refractive particles used in the agglutination system by polymerization of monomers. Ballas at 4:62–5:32. This manufacturing system is completely independent of the enzyme assay, although the Examiner appears to conflate the two, as will become apparent below.

According to the Examiner, Ballas discloses a method for detecting enzymatic activity using a particle by a method comprising particle-catalyzed polymerization of a monomer. The Examiner is mistaken. Ballas does not disclose or suggest a particle-catalyzed polymerization of a monomer. In support of this contention, the Examiner cites to column 5, lines 15–32. In order to provide the appropriate context, column 4, line 62 through column 5, line 32 are set forth below:

> Suitable highly refractive particles can be made from, for example, agarose, polydextran, polyacrylamide and polymeric latexes. Particle shape is not critical, although spherical particles are preferred because they are easiest to prepare and provide maximum lattice density in the agglutinated state. Particle size is somewhat critical. Preferred diameter for spherical particles is from about 30 nm to 100 nm for the agglutination inhibition mode. The most preferred particle is that described in U.S. Pat. No. 4,401,765, issued to Craig et al. on Aug. 30, 1983 on an application filed Oct. 28, 1981. The disclosure of this patent is incorporated herein by reference. These particles have a highly refractive spherical polymer core preferably made of polyvinylnaphthalene and polystyrene. The core has disposed on its surface a reactive shell to which antigens, haptens, etc., can be covalently coupled. A convenient way to control particle size of the polymer particles is first to prepare a seed emulsion whose size can be controlled by the amount of surfactant used. After preparation of the seed emulsion, additional monomer and surfactant can be added at a controlled rate to increase the size of the particles in the seed emulsion.
>
> The outer shell polymer of the polymer particle can be prepared from a wide range of ethylenically unsaturated monomers having functional groups capable of reacting with compounds of biological interest. Optionally, the outer shell can also contain other ethylenically unsaturated monomers. The attachment of the shell polymer to the core can be accomplished by graft polymerization of the functional monomer to the residual ethylenically unsaturated groups in the core polymer or the functional monomer can be polymerized around the core to produce a contiguous shell. Preferred monomers include those containing an

> epoxy group such as glycidyl methacrylate, glycidyl acrylate, vinyl glycidyl ether, and methallyl glycidyl ether. Other functional groups include carboxyl, hydroxyl, amino, and aldehyde.

The cited portion of the specification discusses the manufacture of refractive polymer particles. The particles are useful for the disclosed enzyme assay, in which the disclosed particles agglutinate in the presence of a target enzyme. The manufacturing process disclosed in the cited portion is completely independent of the enzyme assay itself.

The end of the first cited paragraph (col. 5, ll. 10–16) discusses the manufacture of cores for the refractive polymer particles by emulsion polymerization. This portion of the specification does not disclose or suggest a particle-catalyzed polymerization reaction. In fact, at the beginning of the polymerization reaction to manufacture the refractive particles, there are no particles at all. Emulsion polymerization is carried out using an emulsion of immiscible liquids, one of which is or comprises a monomer. For example, EXAMPLE 1, part C discloses the manufacture of polystyrene cores by emulsion polymerization of a styrene-in-water/SDS emulsion, using potassium persulfate/ferrous sulfate as a polymerization initiator, which is dissolved in the aqueous phase. The polymerization reaction was not catalyzed by the cores.

The beginning of the next cited paragraph (col. 5, ll. 17–32) discusses the formation of an outer shell over the core. The outer shell is attached to the core either by graft polymerization to the core or by polymerization of a monomer around the core. This portion of the specification also does not disclose or suggest that the core catalyzes a polymerization reaction. Returning to EXAMPLE 1, part C, a polyvinylnaphthalene intermediate layer was formed on the polystyrene core using a polyvinylnaphthalene-in-water/SDS emulsion and a potassium persulfate polymerization initiator dissolved in the aqueous phase. This polymerization reaction was also not catalyzed by the cores. Finally, a polyglycidyl methacrylate outer shell was formed on the polystyrene/polyvinylnaphthalene cores using a glycidyl methacrylate-in-water/SDS emulsion and a potassium persulfate initiator dissolved in the aqueous phase. Again, the polymerization reaction was not catalyzed by the cores. In conclusion, neither the cited portion of Ballas nor any other portion of Ballas discloses or suggests a particle-catalyzed polymerization of a monomer.

Scheer. Scheer is directed to "controlled deposition of small particles onto surfaces." Scheer at 3:12–14. Turning to FIG. **1**, a deposition apparatus includes a nozzle **21** (reference number **21** appears to refer to both a nozzle and a laser source) that generates a mist of particles **13**. Scheer at 3:37–40. The particles **13** are solid, an oily material, a liquid monomer, or a salt solution. Scheer at 3:37–40, 3:42–44. The particles **13** are deposited on the surface of an article **19**. Scheer at 3:67–4:3. The apparatus comprises a laser-based, airborne particle counter comprising a laser source **21** and detector array **25**, which is positioned to detect obscuration or scattering of light by particles. Scheer 4:10–24. The particle counter continuously samples the chamber atmosphere though an inlet **20**, positioned beneath a substrate location **19***d*. Scheer 4:13–19. The particle counter measures the flux of particles **13** falling through the chamber.

The Examiner refers to column 4, lines 10–25 as disclosing detecting particles on a substrate. The cited portion, however, actually discloses detecting ***airborne*** particles, not particles on a substrate. The disclosure in column 4, lines 10–34 of Scheer is set forth below (emphases added):

> The system also includes a laser-based, *airborne particle counter*, essentially comprising a laser source **21** producing a collimated light beam **23**, and a light detector or detector array **25**. In a preferred configuration, the particle counter continually *samples the atmosphere within the chamber* through an inlet **20** beneath the substrate location **19***d*, using a collimated light source **21**, such as a laser, and a light detector or detector array **25**, to *provide a measure of particles per unit volume per unit time*. The detector **25** is placed in a location relative to the beam **23** to detect either the obscuration of the beam **23** by each particle **13** that crosses through the beam's path or, preferably, the scattering of the light off of the illuminated particles **13** (at location **25'** in FIG. **2**). In either case, *the result is to provide a particle count representative of the flux of the particles 13 falling through the deposition chamber 15*. Such volume sampling particle counters are commercially available from TSI, Inc., Particle Measuring Systems, Inc. of Boulder. Colo. and other vendors. Typical steady state flux values provided by the atomizer **11**, as measured by the particle counter, range from **10** particles/0.1 cfm for large particles of about 4 μm diameter to about 500,000 particles/0.1 cfm for small particles of about 0.1 μm diameter. (0.1 cfm = 47.195 cm^3 sec^{-1}).

Accordingly, the Examiner's own cited passage from Scheer discloses an "*airborne particle counter*" that samples the "*samples the atmosphere within the chamber*" to "*to provide a particle*

count representative of the flux of the particles 13 falling through the deposition chamber 15." Nowhere does the cited passage disclose or suggest detecting a particle on a substrate.

The Examiner also relies on FIG. **1**, referring to the laser source **21**, detector array **25**, and substrate **19***d* illustrated therein (the substrate is actually reference number **19**; reference number **19***d* refers to a substrate location). As discussed above, FIG. **1** illustrates a laser source **21** and a detector array **25** disposed in a housing disposed in the lower right corner of a chamber, which together are components of an airborne particle counter. Airborne particles **13** enter the airborne particle counter through inlet **20**, which is interposed between the laser source **21** and detector array **25**. Airborne particles **13** are detected in the inlet **20**. The substrate location **19***d* is above-and-left of the airborne particle counter and not within the housing. The substrate **19** is not interposed between the laser source **21** and detector array **25**. The laser source **21** is not positioned to illuminate the substrate **19**. The detector array **25** is not positioned to detect any property of the substrate **19**. Scheer does not disclose or suggest that the airborne particle counter interacts in any way with the substrate **19**. Consequently, the apparatus illustrated in FIG. **1** does not disclose or suggest detecting a particle **13** on the substrate **19**.

The Examiner also refers to FIGS. **3A–3C** of Scheer as relevant to detecting a particle on a substrate. The entirety of the description of these figures is at column 5, line, 28 through column 6, line 5, and at column 7, lines 43–61, which describe possible surface deposition patterns for particles on a substrate. Although these drawings depict particles (**53**, **57**, **65**, or **67**) on a substrate (**51**, **55**, or **63**), nothing in this portion of Scheer discloses or suggests detecting a particle on a substrate.

2. The Examiner's Motivation to Combine Scheer and Ballas Is Improper Because the Examiner Has Misinterpreted the Disclosures of Scheer and Ballas, and Because the Examiner's Motivation Does Not Suggest the Desirability of the Claimed Subject Matter

The Examiner states that it would have been obvious to combine the method of detecting a particle on a substrate of Scheer with the particle catalyzed polymerization of Ballas in order to

accurately detect an enzyme on a substrate with optimum sensitivity and high speed. As discussed above, the cited portion of Ballas has nothing to do with the enzyme assay itself. Furthermore, as discussed above, Scheer does not disclose or suggest detecting a particle on a substrate. Also as discussed above, Ballas does not disclose or suggest particle-catalyzed polymerization. Because the alleged motivation is facially erroneous, claim 1 is not obvious over the cited references for at least this reason.

Furthermore, in a proper motivation to combine, the cited references must suggest the desirability of the *claimed subject matter. See, for example,* M.P.E.P. 2143.01(I). In this rejection, as well as in others discussed below, the Examiner's purported motivation has no connection whatsoever with the claimed subject matter. Claim 1 is directed to a method for detecting a particle on the surface of a substrate. The alleged motivation is the detection of an enzyme on a surface with optimum sensitivity and speed. Accordingly, the Examiner's motivation to combine is legally insufficient and the rejection should be overturned.

Moreover, the Examiner has provided no evidence for the purported advantages of combining the references: optimum sensitivity and high speed. Referring to EXAMPLE 2, part E and TABLE 4 of Ballas, the disclosed assay is 100 times more sensitive than the prior art method and takes 3 minutes. The Examiner is silent as to how combining with Scheer would improve the speed and sensitivity of this assay. The Examiner has simply provided no evidence, either in the prior art or known to one skilled in the art, that even if the references were in some way combinable, that the alleged advantages would result from the asserted combination. Accordingly, because the Examiner's motivation to combine is deficient, claim 1 is not obvious over the cited references for at least this reason.

3. There Is No Reasonable Expectation of Success in the Combination of Scheer and Ballas

Furthermore, the enzyme assay of Ballas is not conducted ***on a substrate***; it is conducted in a liquid sample. *See, for example*, Ballas at Abstract ("A method is disclosed for *determining enzymatic activity in a liquid sample* by particle agglutination or inhibition of particle agglutination."); 1:13–15 ("This invention relates to particle agglutination based diagnostic

methods for *detecting enzymatic activity in liquid test samples.*"); 2:50–52 ("This need is met by the present invention which, in a first aspect is *an agglutination based method for detecting an enzyme in a liquid test sample*, comprising:"); 3:6–8 ("In another aspect, the present invention is *an agglutination based method for detecting an enzyme in a liquid test sample*, comprising:"). The Examiner has pointed to no disclosure in either Scheer or Ballas that the emulsion polymerization of Ballas or the enzyme assay ***in a liquid*** is compatible with the ***airborne*** particle detection of Scheer. Accordingly, the Examiner has made no showing of a reasonable expectation of success, and claim 1 is not obvious over the combination for at least this reason.

4. Ballas Is Not Analogous Art

Furthermore, Ballas is also not analogous art. "In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992); M.P.E.P. 2141.01(a).

Ballas is not in the same field of endeavor as the pending claims. Claim 1 is directed to a method for detecting a particle on a substrate "used in the fabrication of an integrated device." Ballas discloses biological assay: a method for detecting enzymatic activity. Biological assays are not in the field of fabrication of an integrated device. The Examiner has not argued otherwise. Ballas is also not analogous art to Scheer, which is directed to depositing particles on silicon wafers and other substrates of the type used in the fabrication of integrated and other electronic devices. Scheer at 3:59–63.

Ballas is also not pertinent to the particular problem with which the inventor was concerned. Particle contamination in the manufacture of integrated devices is among the problems identified in the present application. Specification at 1, ll. 8–9 (¶ **[0002]**) ("Particulate contaminants are undesirable in the fabrication of integrated devices."). Ballas, on the other hand, is directed to an enzyme assay. As discussed above, Ballas does not disclose or suggest detecting a particle on a substrate. Accordingly, Ballas is not pertinent to the manufacture of integrated

devices, and is not analogous art. Consequently, claim 1 is patentable over the cited references for at least this reason.

5. The Examiner Must Accord Patentable Weight to All Features Recited in Claim 1

The Examiner argues that "detecting a particle on a substrate" and "the substrate is used in the fabrication of an integrated device" are recitations of intended use. The Examiner's explanation that "If the prior art structure is capable of performing the intended use, then it meets the claim," reveals that problem with this position: it applies to apparatus claims. The present claims are method claims. Furthermore, because the substrate is recited in the body of claim 1 ("contacting the substrate with a monomer"), the limitations on the substrate recited in the preamble are incorporated into the claim. Accordingly, the Examiner must accord patentable weight to both of these features. Moreover, there is no indication anywhere in the references that "the prior art structure ***is capable*** of performing the intended use."

6. Dependent Claims 2, 7–10, 14–21, and 24 Are Not Obvious Over Scheer and Ballas for At Least the Same Reasons

Because claims 2, 7–10, 14–21, and 24 are dependent on claim 1 and recite additional features, these claims are also not obvious over Scheer and Ballas for at least the same reasons. Although Applicants believe that the above reasons are sufficient to overcome all of the rejections of these claims, the Examiner provided additional rejections. Consequently, the defects of these additional rejections are discussed below.

B. Claims 7 and 8

Regarding claims 7 and 8, the Examiner states that Ballas teaches identifying a particle by a polymerization rate of a monomer, referring to column 5, lines 5–32, and TABLES 1 and 2.

1. Ballas Does Not Disclose or Suggest Polymerization Rates

As discussed above, column 5, lines 5–32 in Ballas describes the manufacture of polymer particles used in an enzyme assay. Also as discussed above, column 5, lines 5–32 do not disclose particle-catalyzed polymerization. Furthermore, nothing in column 5, lines 5–32 discusses polymerization rates or identification of a particle by polymerization rate. TABLE 1 discloses

agglutination rates in an enzyme assay. As discussed above, agglutination is not polymerization. Accordingly, TABLE 1 is irrelevant to the appealed claims. For example, TABLE 1 does not disclose a monomer or a resulting polymer. Also, nothing in TABLE 1 indicates that the agglutination rate changes with particle type. TABLE 2 discloses exemplary enzyme, substrate, and ligand binding partner systems, all of which are agglutination, not polymerization systems. TABLE 2 does not disclose polymerization and is also irrelevant to the appealed claims. TABLE 2 does not disclose rates. TABLE 2 does not disclose different particle types, or the identification of the same. Because the cited combination does not disclose or suggest the additional features recited in claims 7 and 8, and claims 7 and 8 are not obvious over these references for at least this reason.

C. Claims 9 and 10

Regarding claims 9 and 10, the Examiner states that Ballas teaches a monomer that is polymerized by a plurality of particle types, and repeating the contacting and detection steps, again referring to column 5, lines 5-8 and TABLES 1 and 2.

1. Ballas Does Not Disclose or Suggest a Monomer, a Plurality of Particle Types that Catalyze the Polymerization of a Monomer, or Repeated Contacting and Detecting Steps

As discussed above, Ballas does not disclose a particle that catalyzes polymerization of a monomer, and accordingly, cannot disclose a monomer polymerized by a plurality of particle types. Also as discussed above, TABLES 1 and 2 are related to agglutination, not to polymerization. Ballas also does not disclose repeated contact and detection steps for at least the reason that Ballas does not disclose even one contact or detection step as recited in the appealed claims. Moreover, Ballas does not even disclose repeated contact and detection steps in the enzyme assay, or in the manufacture of the refractive particles. Because the cited combination does not disclose or suggest the additional features recited in claims 9 and 10, and claims 9 and 10 are not obvious over these references for at least this reason.

2. The Examiner's Motivation to Combine Is Improper Because the Examiner's Purported Reasons Are Irrelevant to the Claims

The Examiner further states that one would have been motivated to combine Ballas with Scheer because direct agglutination is easier to detect than agglutination inhibition. Again, whether direct agglutination is easier to detect than agglutination inhibition is irrelevant to the patentability of claims 9 and 10 because the claims are directed to polymerization, not agglutination, and because the cited portions of Ballas are directed to manufacture of refractive particles, not an agglutination assay. Moreover, even if one were to accept that direct agglutination were easier to detect than agglutination inhibition, it is entirely unclear as to how this relates to Scheer. Because the Examiner has not provided a proper motivation to combine the cited combination of references, claims 9 and 10 are not obvious over these references for at least this reason.

D. Claims 14 and 15

Regarding claims 14 and 15, the Examiner states that Scheer discloses an aluminum particle and that it would have been obvious to replace the aluminum particle with a copper particle as an obvious design choice.

1. The Examiner Has Cited No Evidence in Support of the Rejection of an Obvious Design Choice

The Examiner cites *In re Leshin* as supporting this rejection. In *In re Leshin*, the court held that selecting a known plastic to make a container of a type made of plastics prior to the invention was obvious. In the present case, the Examiner has not produced any evidence either that aluminum particles disclosed in Scheer catalyze the polymerization of any monomer, or that it is known that copper and aluminum catalyze the polymerization of the same monomers. Accordingly, *In re Leshin* is inapposite to the present facts, and claims 14 and 15 are not obvious over the cited references for at least this reason. Moreover, even if such evidence were of record, the asserted combination of references still lacks recognition of the advantages of the claimed combination with respect to particle detection on a surface.

E. Claims 17 and 24

Regarding claims 17 and 24, the Examiner states that Scheer discloses a single crystal silicon substrate, as well as exposure to an electromagnetic radiation or laser source.

1. Scheer Does Not Disclose or Suggest a Single Crystal Silicon Substrate, or Exposure to an Electromagnetic Radiation or Laser Source

Scheer does not appear to disclose a single crystal silicon substrate or exposure to a source of electromagnetic radiation, or laser source. Because the cited combination does not disclose or suggest the additional features recited in claims 17 or 24, and claims 17 and 24 are not obvious over these references for at least this reason.

F. Claim 18

Regarding claim 18, the Examiner states that Scheer discloses a vapor phase monomer, referring to reference numbers **11**, **12**, **16**, **18**, and **21**, of FIG. **1**.

1. Scheer Does Not Disclose or Suggest, and Teaches Away from a Vapor Phase Monomer

Scheer discloses that the particles **13** are solid, an oily material, a liquid monomer, or a salt solution. Scheer at 3:37–40, 3:42–44. The sole disclosure of a monomer is to a "liquid monomer." Scheer at 3:44. Scheer does not disclose or suggest that the monomer is in the vapor phase. In fact, a vapor phase monomer would be undetectable in the apparatus illustrated in FIG. **1** because a vapor phase monomer would not occlude the light bean **23**, and consequently, would not be detected by the light detector **25**. Consequently, Scheer actually teaches away from this feature. Because the cited combination does not disclose or suggest the additional features recited in claim 18, and claim 18 is not obvious over these references for at least this reason.

G. Claims 19 and 20

Regarding claims 19 and 20, the Examiner states that Ballas teaches alkenes selected from styrene, methyl acrylate, ethyl acrylate, methyl methacrylate, and acrylonitrile, and that one would be motivated to combine Ballas with Scheer for the purpose of adding material at a controlled rate to increase the size of the particles in the seed emulsion.

1. The Examiner's Motivation to Combine Is Improper Because Ballas Does Not Disclose the Purported Reason

Ballas does not appear to disclose that any particular alkene, including styrene, methyl acrylate, ethyl acrylate, methyl methacrylate, or acrylonitrile, has any particular advantage in forming a seed emulsion. Neither claim 19 nor claim 20 recites a seed emulsion. The Examiner has not provided any explanation as to why the purported motivation, even if correct, would be beneficial in detecting a particle on a substrate. Moreover, it is unclear why how the Examiner's stated motivation would motivate one to combine with Scheer, particularly because Scheer is directed to detecting *airborne* particles, which seed emulsions comprise a plurality of *liquid* phases. Because the cited references do not provide a proper motivation to combine, claims 19 and 20 are not obvious over the cited references for at least this reason.

H. Claim 21

Regarding claim 21, the Examiner states that it would have been obvious to select aniline and thiophene as monomers as a matter of obvious design choice, again citing *In re Leshin.* This rejection is improper for the same reasons the rejection of claims 14 and 15 are improper, and should be overruled.

I. Claim 3

Claim 3 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Scheer in view of Ballas and further in view of Asano. Claim 3 is dependent on claim 1, and further provides, in relevant part, "the particle counter is capable of detecting particles on both sides of the substrate without unmounting the substrate." The Examiner relies on Asano for disclosing a particle counter that detects particles on both sides of a substrate. Without acquiescing to the Examiner's characterization of Asano, as discussed above, claim 1 is not obvious over Scheer and Ballas. Because claim 3 is dependent on claim 1, claim 1 is not obvious over Scheer, Ballas, and Asano for at least the same reasons as claim 1 is not obvious over Scheer and Ballas.

1. The Cited Combination Provides No Reasonable Expectation of Success

Moreover, the Examiner has provided no description of how the purported particle counter of Asano is combinable with the combination of Scheer and Ballas. Accordingly, the

Examiner also has not provided the requisite expectation of success found in the cited references or known to one skilled in the art, and the rejection is improper for at least this reason.

2. The Examiner's Motivation to Combine Asano Is Inconsistent with the Motivation to Combine Scheer and Ballas, and Hence, Is Improper

Furthermore, the Examiner's motivation for combining Scheer with Ballas was to provide an improved enzyme assay. In adding Asano, the Examiner's motivation is high speed and accurate detection of particles on a wafer during wafer cleaning. The Examiner has provided no explanation as to why a skilled artisan would combine Scheer and Ballas to create an improved enzyme assay, and then further modify the resulting enzyme assay for semiconductor wafer cleaning.

J. Claims 4–6

Claims 4–6 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Scheer in view of Ballas and further in view of Tullis. Claims 4–6 are dependent on claim 1. The Examiner states, without citation, that Tullis discloses an optical particle counter that detects absorbance, fluorescence, reflectance, refractive index, or polarization. Without acquiescing to the Examiner's characterization of Tullis, claims 4–6 are dependent on claim 1, which as discussed above, is not obvious over Scheer and Ballas. Accordingly, claims 4–6 are not obvious over Scheer, Ballas, and Tullis for at least the same reasons.

1. Tullis Teaches Away from Claims 4–6

Tullis appears to be directed to a system for calibrating a scanner that *minimizes particle reflectance.* Tullis at Abstract ("*Particles which contaminate the antireflectance film on the substrate do not scatter sufficient light to be detected by the surface analysis scanner detectors* and thus do not interfere with the calibration of the scanner. ... . A surface analysis scanner system may also include *methods, utilizing antireflectance films, for reducing the amount of scanned light scattered by particles on a scanner system surface.*"). Accordingly, Tullis appears to ***teach away*** from detecting a particle on a substrate, and consequently, claims 4–6 are not obvious over the cited combination for at least this reason.

2. The Examiner's Motivation to Combine Tullis Is Inconsistent with the Motivation to Combine Scheer and Ballas, and Hence, Is Improper

With respect to motivation, the Examiner states that one would have been motivated "for the purpose of detecting and analyzing particles on the silicon wafers with parameters as sensitivity, counting accuracy, uniformity, dynamic range, spatial resolution and stability." As with Asano, the Examiner appears to have completely abandoned the motivation for combining Scheer with Ballas asserted in the rejection of claim 1: an improved enzyme assay. Again, the Examiner provides no explanation as to why one skilled in the art would be motivated to use the improved enzyme assay alleged as the motivation for combining Scheer and Ballas with the alleged motivation to detect and analyze particles on silicon wafers. Moreover, the Examiner has not explained what such a combination would entail. Consequently, Applicant submits that the Examiner has not provided a proper motivation to combine, and requests that the rejection be overruled.

K. Claims 11–13

Claims 11–13 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Scheer in view of Ballas and further in view of Yoshimura. Claims 11–13 are dependent on claim 1. Because claims 11–13 are dependent on claim 1, and claim 1 is not obvious over Scheer and Ballas, claims 11–13 are also not obvious over Scheer, Ballas, and Yoshimura for at least the same reasons.

1. The Examiner's Motivation to Combine Yoshimura Is Inconsistent with the Motivation to Combine Scheer and Ballas, and Hence, Is Improper

The Examiner states that Yoshimura discloses a plurality of monomers contacted with the substrate simultaneously or sequentially. The Examiner refers to column 7, lines 45–63 and column 11, lines 23–45, which appear to disclose a nonlinear optical material synthesized in a photochemical gas phase process.

The Examiner's motivation to combine is to improve the nonlinear optical material formed in molecular beam deposition or molecular beam epitaxy. Nothing in Yoshimura, Scheer, or Ballas would appear to provide a proper motivation to combine these references, and the

Examiner provides none. Neither Scheer nor Ballas has any disclosure of molecular beam epitaxy, molecular beam deposition, or nonlinear optical materials. Yoshimura does not appear to disclose detecting a particle on a substrate or a particle that catalyzes polymerization. The Examiner has not explained how Yoshimura is applicable to the improved enzyme assay that was provided as the motivation for combining Scheer and Ballas. Nothing connects these references other than hindsight reconstruction of the claim by the Examiner. Accordingly, Applicants submit that the rejection is improper and request overruling of the same.

2. There Is No Reasonable Expectation of Success in the Combination at Least Because Yoshimura Does Not Disclose or Suggest a Particle-Catalyzed Polymerization Reaction

The Examiner also has provided no evidence of any kind that the monomers disclosed in Yoshimura have any applicability in the detection of a particle on a surface. In fact, the disclosed monomers are photopolymerized, using a visible or ultraviolet light source to induce polymerization. Yoshimura at 11:11–17. Nothing in Yoshimura or any of the cited references discloses or suggests that particles catalyze polymerization of any of the monomers disclosed in Yoshimura. Accordingly, absent any reasonable expectation of success, claims 11–13 are patentable over the cited combination for at least this reason.

L. Claims 22 and 23

Claims 22 and 23 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Scheer in view of Ballas and further in view of Hahn. Claims 22–23 are dependent on claim 1. Because claim 1 is not obvious over Scheer and Ballas, claims 22–23 are also not obvious over Scheer, Ballas, and Hahn for at least the same reasons.

1. Hahn Does Not Disclose Benzyl Bromide

The Examiner states that Hahn discloses benzyl bromide as a free radical initiator. Hahn does not appear to disclose benzyl bromide at all. Because the cited references do not disclose or suggest every feature recited in claim 23, claim 23 is not obvious over the cited references for at least this reason.

2. The Examiner's Motivation to Combine Hahn Is Inconsistent with the Motivation to Combine Scheer and Ballas, and Hence, Is Improper

Hahn appears to be directed to a method for producing a low gloss coating by a three-stage process comprising: exposure to ionizing radiation in the presence of a cure inhibiting amount of oxygen; exposure to ultraviolet radiation in the absence of a cure inhibiting amount of oxygen; and exposure to ionizing radiation. The Examiner's stated motivation to combine Hahn is to produce a low gloss, burnish resistant, radiation cured material. Hahn does not appear to disclose or suggest detecting a particle on a substrate. Neither Scheer nor Ballas appear to have any disclosure or suggestion that a low gloss, burnish resistant, radiation cured material would, in any way, be desirable for any purpose, let alone the improved enzyme assay cited by the Examiner in the rejection of claim 1. Accordingly, the Examiner's motivation is again deficient and the rejection is improper. Applicant requests overruling of the same.

3. Hahn Is Not Analogous Art

Hahn is also not analogous art. Hahn appears to be directed to paints and/or finish coatings, and does not appear to be related in any way to the fields of the primary or secondary references, nor to the claimed context of particle detection on a substrate. Accordingly, the rejection is improper, and claims 22 and 23 are patentable over the cited references for at least this reason.

M. Conclusion

Because each of the outstanding rejections of the appealed claims is improper, Applicant requests that the Board find all appealed claims allowable over the references of record.

VIII. CLAIMS APPENDIX

The following is a listing of the claims on appeal.

1. (Original) A method for detecting a particle on a substrate, wherein the substrate is used in the fabrication of an integrated device, the method comprising:

contacting the substrate with a monomer, wherein the particle catalyzes the polymerization of the monomer, and

detecting the particle using a particle counter.

2. (Original) The method of claim 1, wherein the particle counter detects a property selected from the group consisting of number of particles, sizes of the particles, positions of the particles, and combinations thereof.

3. (Original) The method of claim 1, wherein the particle counter is capable of detecting particles on both sides of the substrate without unmounting the substrate.

4. (Original) The method of claim 1, wherein the particle counter detects particles optically.

5. (Previously presented) The method of claim 4, wherein the particle counter is a laser scanner.

6. (Original) The method of claim 4, wherein the particle counter detects a property selected from the group consisting of absorbance, fluorescence, reflectance, refractive index, and polarization.

7. (Original) The method of claim 1, wherein the composition of the particle is identified.

8. (Original) The method of claim 7, wherein the composition of the particle is identified by the polymerization rate of the monomer.

9. (Original) The method of claim 8, wherein the monomer is polymerized by a plurality of particle types.

10. (Original) The method of claim 8, further comprising repeating the contacting and detecting steps.

11. (Original) The method of claim 1, wherein the substrate is contacted with a plurality of monomers.

12. (Original) The method of claim 11, wherein a plurality of monomers contact the substrate simultaneously.

13. (Original) The method of claim 11, wherein a plurality of monomers contact the substrate sequentially.

14. (Original) The method of claim 1, wherein the particle is a metal.

15. (Original) The method of claim 14, wherein the metal is copper.

16. (Original) The method of claim 1, wherein the substrate comprises silicon.

17. (Original) The method of claim 16, wherein the substrate comprises a single crystal silicon wafer.

18. (Original) The method of claim 1, wherein the monomer is in the vapor phase.

19. (Original) The method of claim 1, wherein the monomer is an alkene.

20. (Original) The method of claim 19, wherein the alkene is selected from the group consisting of styrene, methyl acrylate, ethyl acrylate, methyl methacrylate, and acrylonitrile.

21. (Original) The method of claim 1, wherein the monomer is selected from the group consisting of aniline and thiophene.

22. (Original) The method of claim 1, further comprising an initiator.

23. (Original) The method of claim 22, wherein the initiator is benzyl bromide.

24. (Original) The method of claim 1, wherein the substrate is irradiated with electromagnetic radiation.

IX. EVIDENCE APPENDIX

The following U.S. Patents are relied on as evidence in this appeal: Scheer (U.S. Patent No. 5,194,297), Ballas (U.S. Patent No. 4,812,396), Asano (JP 2003031542), Tullis (U.S. Patent No. 5,144,524), Yoshimura (U.S. Patent No. 5,194,548), and Hahn (U.S. Patent No. 4,170,663). Each of these references was first cited by the Examiner in an Office Action mailed August 24, 2005.

X. RELATED PROCEEDINGS APPENDIX

There are no related proceedings.

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